

## **REMARKS**

Claims 1-2 and 4-8, 11, 13-14, and 33-34 are now pending in the application. Claims 3, 9, 10, and 12 have been cancelled. Claims 1, 6, and 11, and 13 have been amended to clarify and more particularly point out the present invention. New dependent Claims 33 and 34, which depend from Claim 1, have been introduced. Support for these new claims and amendments is found in Applicants' specification at Paragraph 21 on Pages 6 – 7; Paragraph 22 on Pages 7 - 8; Paragraph 23 on Page 8; and Paragraph 35 on Pages 11-12. Entry of these new claims and amendments is requested. The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the amendments and remarks contained herein.

## **REJECTIONS UNDER 35 U.S.C. § 102 AND 35 U.S.C. § 103**

Claims 1-4, 6 and 8-14 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Chen et al. (U.S. Pub. No. 2003/0129126), hereinafter "the Chen reference". Claims 1-6 and 8-14 stand rejected under 35 U.S.C. § 102(e) as being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Chen. Claim 7 stands rejected under 35 U.S. C. § 103(a) as being unpatentable over the Chen reference. These rejections are respectfully traversed.

Claim 1 as amended recites a method of storing hydrogen where hydrogen is contacted with an imide represented by  $M^c(NH)^{-2}_{c/2}$ , where M represents a cationic species of at least one of: Li, Mg, Na, B, Al, Be, Zn, and mixtures thereof and c represents an average valence state of M. The imide forms at least two distinct compounds different from said imide upon reaction with hydrogen. In particular, in

dependent Claims 2, 4, 5, and 7, the imide is contacted with hydrogen to form an amide and a hydride.

While the Chen reference discloses various reactions to store hydrogen, the Chen reference does not disclose reacting an imide having a cationic species of at least one of: Li, Mg, Na, B, Al, Be, Zn, and mixtures thereof with hydrogen to form two distinct compounds for storing hydrogen. Rather, the Chen reference discloses reacting a nitride (such as  $\text{Li}_3\text{N}$ ) with hydrogen to form an amide (such as  $\text{LiNH}_2$ ) and a hydride (such as  $\text{LiH}$ ). In Chen, where the cationic species is lithium, the amide and hydride are further reacted with hydrogen to form an allegedly novel compound. Page 4 at Paragraphs 45-46; Equation 3. While the Chen reference refers to this compound as a lithium enriched imide, the compound has a different structure and allegedly different and improved physical characteristics. Page 4 at Paragraphs 45 and 49. As reflected in Equation 3, an imide could potentially be formed, however, the Chen reference explicitly discloses that the only reversible reaction to store hydrogen occurs with the novel compound  $\text{Li}_m\text{NH}_n$ , where  $2 < m < 3$ ,  $0 < n < 1$ ,  $m + n = 3$ , being exposed to hydrogen at specific temperature and pressure conditions to form an amide and a hydride. Equation 4 and Paragraphs 49-51 on Page 4. Thus, the reaction between  $\text{Li}_m\text{NH}_n$  and hydrogen was demonstrated to be the only route for reversible hydrogen storage. See, e.g., Page 4 at Paragraph 49. The Chen reference does not disclose or suggest that an imide can be reacted with hydrogen to form the amide and imide compounds, and specifically excludes a lithium imide compound from Equation 4.

In fact, the Chen reference teaches away from a reaction of an imide with hydrogen, because while it discloses that an imide can be formed in Equation 3, it then

goes on to exclude an imide compound from the hydrogen storage reaction to form an amide and an imide compound in Equation 4, where  $m$  is greater than 2 and  $n$  is less than 1 (but not greater than or equal to and less than or equal to, as in Equation 3). This reinforces the teaching that the allegedly novel “Li-enriched imide” is the only compound of the Chen reference that is disclosed or suggested as being capable of storing hydrogen and forming two distinct compounds, such as an amide and an imide. Thus, Claim 1 and its dependent Claims 2 and 4-8, 11, 13-14, and 33-34 are not anticipated nor are they rendered obvious by the Chen reference. Accordingly, Applicants respectfully request withdrawal of the rejection and reconsideration of these claims.

The Chen reference discloses a calcium imide reacted with hydrogen to form a calcium amide and a calcium hydride on Page 5 at Paragraphs 68-69. However, as recited in Claim 1 and hence in Claim 7 in the present application, an imide is limited to where a cationic species is at least one of: Li, Be, Mg, Na, Al, Be, Zn, and mixtures thereof, which does not include calcium. These particular elements form compounds that are characterized as true imides and amides, which find particular utility in methods of storing hydrogen by contacting an imide with hydrogen, as recited in Claim 1. Claim 7 recites a limitation of an imide represented by the formula  $MgNH$ , forming an amide represented by the formula  $Mg(NH_2)_2$  and the hydride represented by  $MgH_2$ . It should be noted that calcium is significantly heavier than magnesium. Further, calcium does not generally follow the simple chemistry of relatively lighter cationic elements, instead forming related phases, generally categorized as hydride/nitrides. See Applicants’ specification at Paragraph 22 pages 7 – 8, for example. Therefore, the Chen reference

does not disclose, suggest, or provide any motivation to substitute calcium for magnesium to arrive at the invention recited in Claim 7, which provides a true imide, amide, and hydride by virtue of the inclusion of magnesium, rather than of calcium which generally does not follow the behavior of a true imide/amide system. As such, Applicants submit that Claim 7 is not rendered obvious by Chen, and Applicants respectfully request withdrawal of the rejection and reconsideration and allowance of the claims.

#### **CONCLUSION**

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

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By: Jennifer M. Woodside Wojtala  
Jennifer M. Woodside Wojtala  
Reg. No. 50,721

CORRESPONDENCE ADDRESS:

Kathryn A. Marra  
General Motors Corporation  
Legal Staff - Mail Code 482-C23-B21  
PO Box 300 - 300 Renaissance Center  
Detroit, Michigan 48265-3000  
Ph: 313-665-4708  
Fax: 313-665-4976

JMW/sem